



IBM Research

Breakthrough innovations for the societies of the future

Dr. Matthias Kaiserswerth

Director IBM Zurich Research Laboratory
VP Global Systems Management and Compliance Area Strategy
IBM Research

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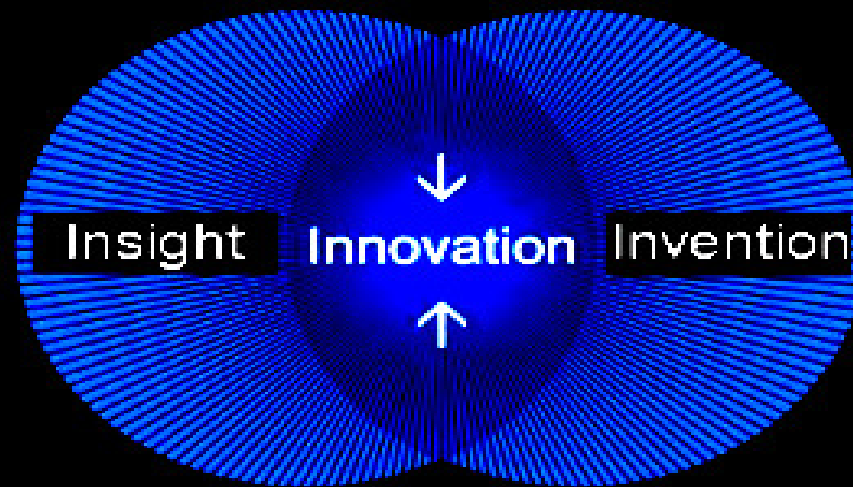
Agenda

- **Innovation - Key Findings**
- **InnovationJam**
 - One Approach to Collaborative Innovation
- **Improving the World through Innovation**
 - Branchless Banking
 - IBM "Green" Initiatives
 - Pyr.me.IT
- **Learning from Innovations in the Developing World**
 - Bharti Airtel
- **Conclusion**

What is Innovation

Innovation occurs at the intersection of invention and insight.

It's about the application of invention – the fusion of new developments and new approaches to solve problems.



The Global CEO Study 2006

The Largest of it's Kind

General Information

Scope:

- 765 CEOs

Objective:

- Understand the role of Innovation on CEOs agenda

Innovation Definition:

- “New ideas or current thinking applied in fundamentally different ways resulting in significant change”

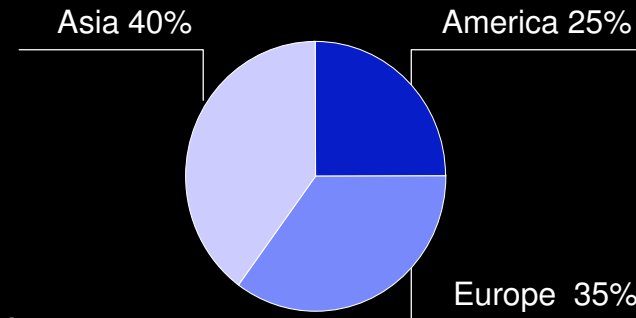
Innovation Focus:

- Products, services and markets
- Operations
- Business models

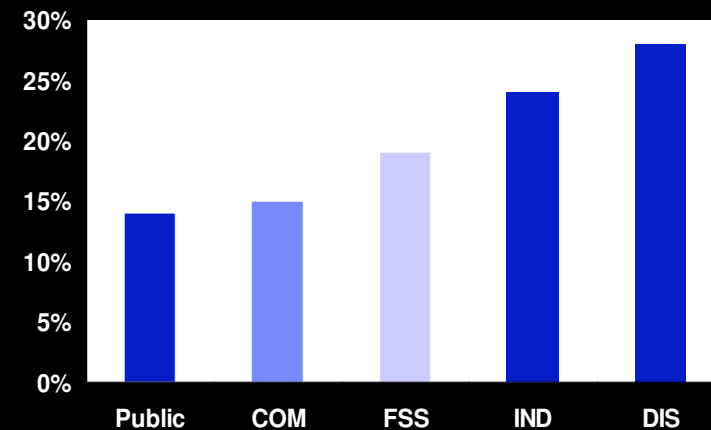
Methodology:

- 80% in-person (IBM); 20% telephone
- Included a structured questionnaire
- Analysis included financial data

Distribution by Geography



Distribution by IBM Sector



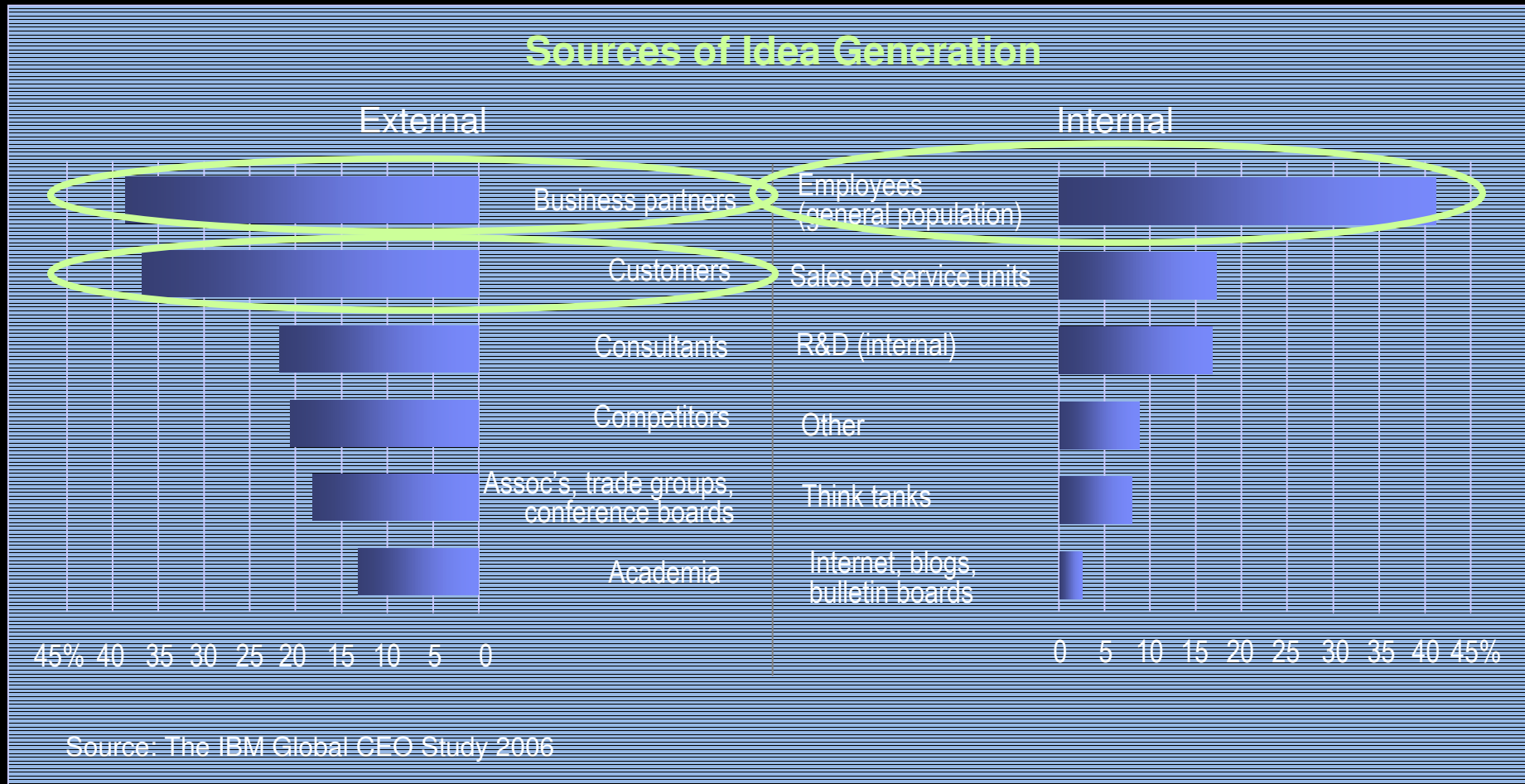
Study Findings

An Innovation Reality Gap

- Myth: Innovation means coming up with new or better products and services
 - ↳ – Reality: Business model innovation matters
- Myth: Innovation is the responsibility of brand and product managers
 - ↳ – Reality: Innovation must be orchestrated from the top
- Myth: Innovation happens from within – most often generated by product developers and research groups
 - ↳ – Reality: External collaboration is indispensable

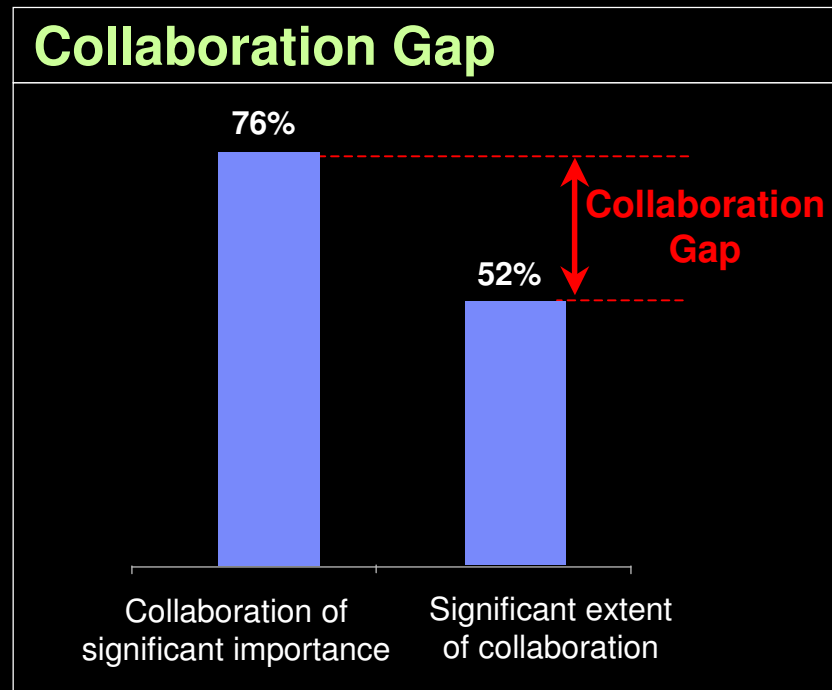
Sources of Innovative Ideas

Inside and Outside of the Organisation



Collaboration Gap

In the Mind of the CEO



- ❖ **External Collaboration is crucial – in particular since rapidly changing and growing customer wants & needs increase complexity and level of required responsiveness**

Statements

- “Without collaboration innovation would be impossible.”
- “...key for success will be to focus on core competencies and rapidly form intelligent partnerships...”
- “...alliances are needed for non-core activities...”
- “Partners...extract maximum value and avoid reinventing the wheel.”
- “It would be counterproductive to do everything yourself.”

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The Global InnovationJam

An invitation to collaborate

What is InnovationJam?

- A large-scale on-line discussion forum in which clients, partners and IBM employees discussed potential innovations made possible at the intersection of emerging, new technologies and major business/societal shifts

What is special about InnovationJam?

- First IBM Jam to include IBMers, our clients, business partners, academia and even family members

Why?

- To create breakthrough new marketplace opportunities and partnerships for IBM and its clients

What is a Jam?

- A Collaborative Innovation Tool
- Developed by IBM to accelerate innovation – both idea discovery and implementation
- Structured as a multiple-day, web-based forum in which participants engage as equals to brainstorm and propose new ideas

InnovationJam *

Innovation Jam 2006

Participants

- More than **150,000** participants
- **104** countries represented
- **67** client, partner and university organizations participating
 - Sample organizations: American Express, Bank of America, Boeing, Disney, Honda, Nestle, Pfizer, Shell, Stanford University, Samsung, MIT, UPS
 - 12,000+ IBM family members signed up
- **\$100 million** investment over next **two** years to pursue **ten** new businesses generated by InnovationJam



InnovationJam *

Innovation Jam 2006



Outcomes

- **Smart Healthcare Payment Systems**
- **Simplified Business Engines**
- **Real-time Translation Services**
- **Intelligent Utility Networks**
- **“Digital Me” (personal content service)**
- **Integrated Mass Transit Information System**
- **Electronic Health Record System**
- **3D Internet (building a seamless, standards-based 3D Internet)**
- **“Big Green” Innovations (new business unit)**
- **Branchless Banking for the Masses**

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Branchless Banking

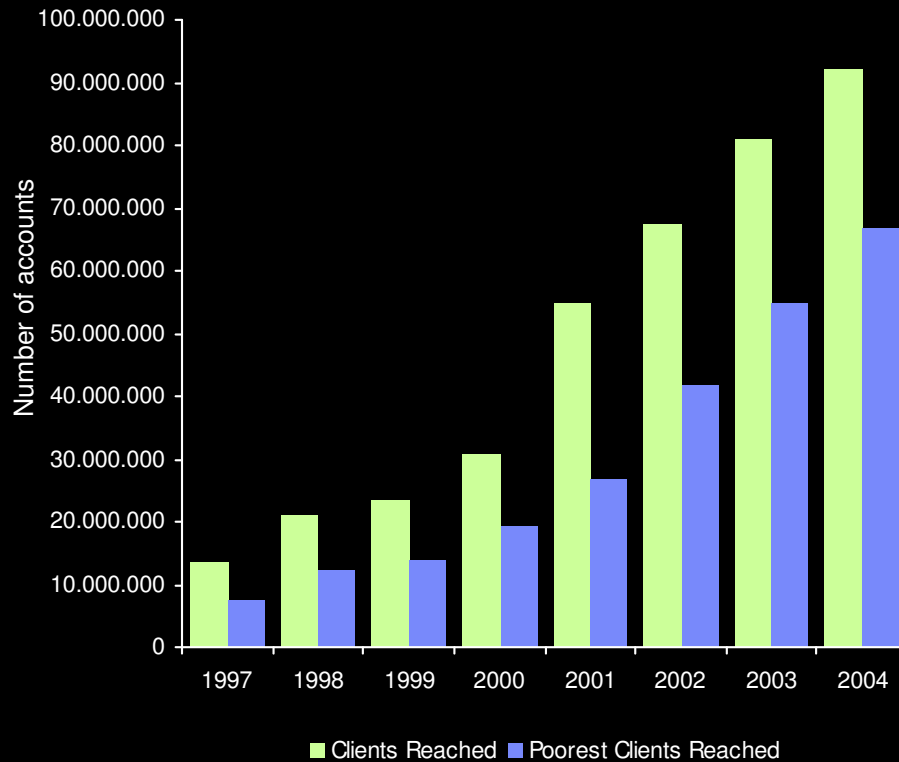
Access to financial institutions for the masses

To enable entirely new business models that would allow financial institutions to profitably provide basic banking services (checking, savings, payments, micro-lending) to unbanked populations in fast-growing emerging markets.

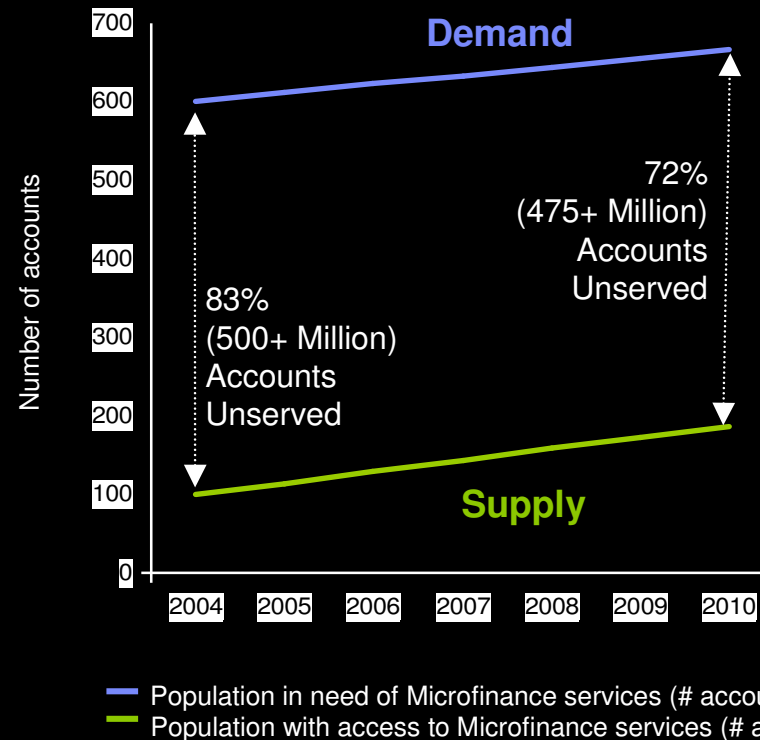
Customers Reached by Microfinance Institutions

Number is increasing, but significant demand is still unmet

Microcredit Client Reach
Number of accounts



Supply and Demand of Microfinance
Number of accounts, millions



Two Initiatives to Help Bank the Unbanked

Areas of impact

- Processing
- Distribution
- Credit / Risk

Initiative

Description

Status

Microfinance processing hub



- Build processing hub capability by**
- Increased participation in FINO (e.g. channel integration, processing)
 - Export model to other geographies (Brazil, Indonesia, China)

- In active conversations with anchor banks and microfinance institutions in target markets
- Completed estimation of market size for Microfinance Processing Hubs worldwide and sequence of rollout

Open source core banking for microfinance



- Support introduction of OS core banking application to lower operating costs for MFIs
- Partner with a microfinance Foundation to strengthen Mifos open source solution

- Currently supporting the implementation of Mifos in a Microfinance Institution in India
- Actively developing the transformation of the core banking application to run in a ASP environment
- Finalizing terms for longer term partnership

IBM "Green" Initiatives

Through collaborative innovation with our partners and clients IBM will use IT to optimize the use of energy and water in enterprises, industries and countries, leveraging our deep computational, science & technology expertise.

IBM's Commitment to Energy and Environment



1992

IBM becomes charter member of EnergyStar program

2005



A Better Planet



Explore >

2006

IBMers "jam" on innovations for a better planet, and IBM invests \$20M



Big Green Innovations
 Intell. Utility Network

40%

reduction in IBM's total worldwide CO2 emissions attributable solely to its energy conservation efforts between 1990 and 2005.

1990

1971

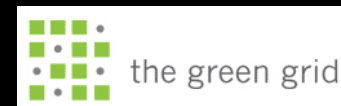
IBM formally establishes a Corporate policy on Environmental Affairs



1996

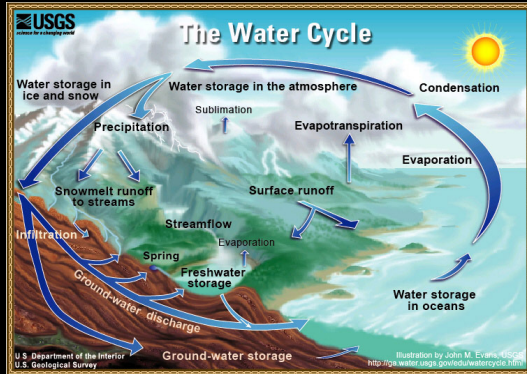
In remarks at a White House briefing on climate change, Vice President Gore applauded IBM's new PFC emissions reduction goal.

"These developments send a strong message: A healthy environment and a healthy economy go hand in hand," the Vice President said. "Through technology and innovation, we can turn this challenge into a huge opportunity for business and for America. And the sooner we act, the easier it will be."



Collaborating to solve problems

IBM "Green" Initiatives



Big Green Innovations



Corporate Sustainability



Smart Oil Fields



Intelligent Transportation Systems



Intelligent Utility Network



Copyright 2005. Barcelona Supercomputing Center - BSC

Green Data Center

Towards the "Greenest" of Green Datacenters

Zero-Emission Datacenter

- **Datacenter operation more expensive than hardware depreciation**
 - Total cost of ownership used for evaluation of future datacenters
- **Politics and public opinion demand carbon footprint reduction**
 - Efficient datacenters to fulfill carbon footprint reduction targets
- **Climate challenge provides business opportunities for IBM**
 - Win-win for IT manufacturer and datacenter operators



Towards the "Greenest" of Green Datacenters

Zero-Emission Datacenter

- Research initiative that aims at developing a solution for a highly energy-efficient datacenter that runs entirely carbon neutral (= zero emission).
- To realize zero-emission, IBM Researchers take an holistic approach towards cooling from the individual processor to the entire datacenter

Approach:

- Reduce cooling energy by innovative, more effective liquid cooling systems:
 - Tailored **liquid cooling** systems directly on the chip, where the cooling is needed
 - **Hot-spot cooling** on chip, rack, and datacenter level
- **AND** Re-use "waste heat" for remote heating:
 - Cool only as much as needed to obtain recyclable "waste heat" for remote heating



Pyr.mea.IT

Permeating IT towards the base of the pyramid –
populations which currently make less than \$5/day

Enable 1 billion users to access IT by:

- Providing low cost highly available access to network based applications
- Developing and deploying highly scalable solutions hosted on the network
- Radically simplifying IT access mechanisms
- Proposing an information ecosystem model to address information needs of population

The Solution Walkthrough

Service delivery to villagers through (mobile) phones by voice interface



The kiosk operator gathers local information from various sources: train schedule, blackout timing, weather information, market prices, ...

The operator uploads information through a phone.

Villagers call the VoiceKiosk to get information: electricity-blackout timings, train schedule, weather prediction, and more



Voigen builds a voice interface for people to access information through the phone.

Real-time Matchmaking

Applicability for Micro Businesses

- Mobility is an inherent factor of many businesses in developing countries
 - Mobile fruit sellers, transport sector, individual micro businesses
- A large sector of Indian markets are extremely decentralized
- In many growth markets, individual/small businesses are becoming a significant portion of workforce and revenue streams



Nomadic vendors face three challenges in effective customer interaction

- Sporadic availability of individual vendors: vendors start and finish jobs/tasks in unpredictable patterns
- Discovering nomadic available vendors on-demand: no provider infrastructure for customers to spontaneously locate the *best* and *closest* and *most reputed* vendor
- Lack of personalizable interfaces for customer interaction: vendors cannot waste time handling calls from prospective customers

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Learning from Innovations in the Developing World

- **Generic Medicine**
 - Dr. Reddy's from India
- **Banking Branch Optimization**
 - Bank of China
- **Aircraft Manufacturing**
 - Embraer from Brazil
- **Mobile Technology and Services**
 - Bharti from India

Bharti Airtel: Leading through Innovation

- **Bharti Airtel is the first and leading private telecommunications company in India. The company's history has been characterized by strong growth and market leadership.**
- **Bharti is reaching a new stage in its maturity cycle and recognizes that, as competition intensifies, there will be an increasing requirement to achieve operational efficiencies and new revenue streams.**
- **The solution was a full-scope transformational outsource to IBM and leading telcos.**

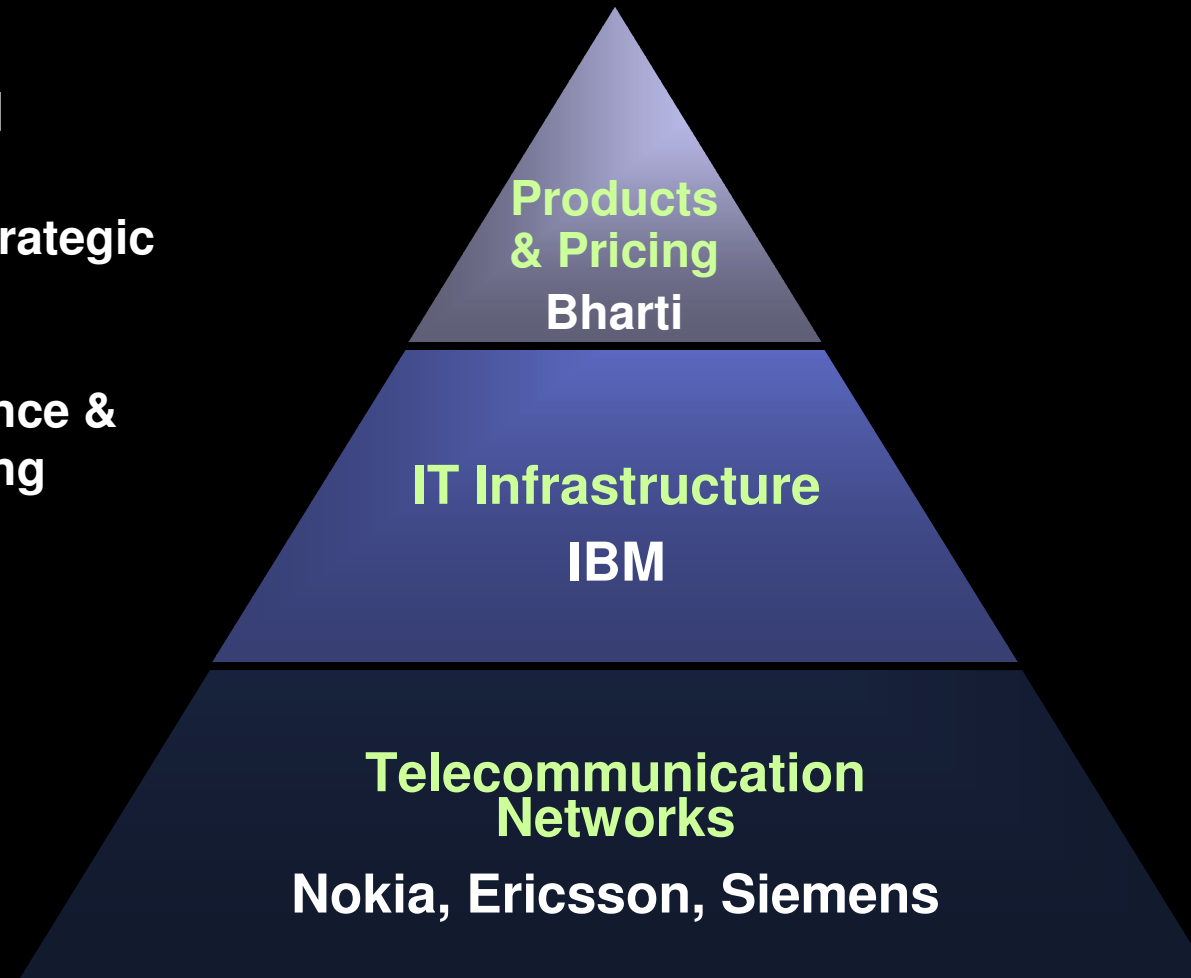


Bharti Airtel: Leading through Innovation

Bharti's revolutionary business model is a global success story

Bharti and IBM

- Large-scale strategic outsourcing
- Strategic alliance & revenue sharing

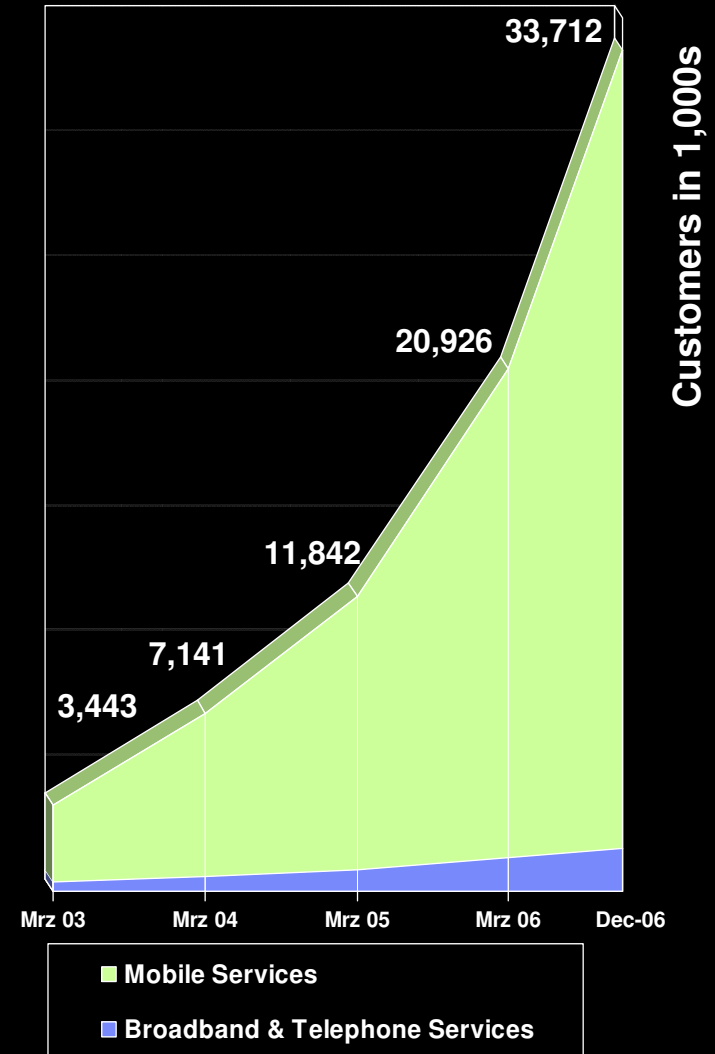


Bharti Airtel

Key Results

- Immense growth in subscribers (from 3.5 to over 30 million in 3 years).
- IBM has facilitated Bharti's growth from a predominantly mobile company to an integrated telecom player.
- IBM has helped Bharti to expand its footprint – even in places such as Jammu, Kashmir and NESAs (North Eastern States and Assam).
- Today, Bharti is the only service provider operating in all 23 mobility circles and in over 75 cities for fixed-line services.

Bharti Airtel: Increase in customer base between 2003 - 2006



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Nature of Innovation is Changing

From



To

Local R&D teams

Global collaborative R&D teams

Central innovation model

Collaborative innovation

Single disciplinary

Multidisciplinary

Product functions

Value to customers

Information science

Services science

Proprietary IP model

Well-balanced IP model

Product-focused innovation

Multifaceted innovation

Conclusion

In the IT industry it is no longer only about speeds, feeds, and capacity

Innovation will lead the way

Major external drivers are:

- **Digital convergence (and divergence)**
- **Population shifts and changing demographics**
- **Globalization**



Community Idea Generation

↳ Rewards Portal

I would love to access a service that shows all rewards balances, not just for financial related rewards (i.e. affinity card points) but also for the multiple suppliers who also offer incentive based programs (Home Depot, Office Depot, Best Buy, etc.). If Bank of America offers this, I wasn't aware of it and would suggest some way of getting the word out, possibly through the On Line Banking channel. If there was a consolidation portal for this, it could allow a financial institution to become one the "portals of choice" and also possibly facilitate packaging and exchanging of rewards points & banking products to create new value propositions for customers.

Innovation Focus: None chosen
Emerging Technologies: None chosen

Bob Burkhard
IBM, US
[@us.ibm.com](mailto:us.ibm.com)
15:44 UTC, Jul 26, 2006

IBM employee posts an idea

↳ RE: Rewards Portal

Bob, if the rewards points can be accessed via the web then you can link it to your portfolio. The linkage at this point is only around travel reward points (hotel, airline, and rentals). But the suggestion is a great one.

Innovation Focus: None chosen
Emerging Technologies: None chosen

David Harris
Bank of America, US
[@bankofamerica.com](mailto:bankofamerica.com)
12:32 UTC, Jul 27, 2006

Bank of America participant expands on the idea

Airmiles to Make-A-Wish Foundation

Merely as information, not a solicitation, you can donate airmiles to the Make-A-Wish Foundation, which grants wishes to children with serious medical conditions (like sending them to Disneyworld or the World Cup Finals).

Here's the link: <http://www.wish.org/home/giving/airmiles...>

You can also donate points from loyalty programs for hotels and such as well.

Innovation Focus: Processes
Emerging Technologies: Extracting Insight

Jay Cadmus
IBM, US
[@us.ibm.com](mailto:us.ibm.com)
20:27 UTC, Jul 24, 2006

Another IBM employee expands the idea further

↳ good idea

I recently saw a TV program about the Make-a-wish foundation and I feel that it's a great way to give the children with incurable diseases a final wish of what they want to do the most, and it is always great to see the smile on these children's faces.

Innovation Focus: None chosen
Emerging Technologies: None chosen

Eric Cheng
Family, US
[@hotmail.com](mailto:hotmail.com)
17:56 UTC, Jul 25, 2006

Family participant agrees with the a related idea

Refer free miles as micropayment

The free airlines miles, could be treated as micropayments. It would allow trading, converting and donating them.

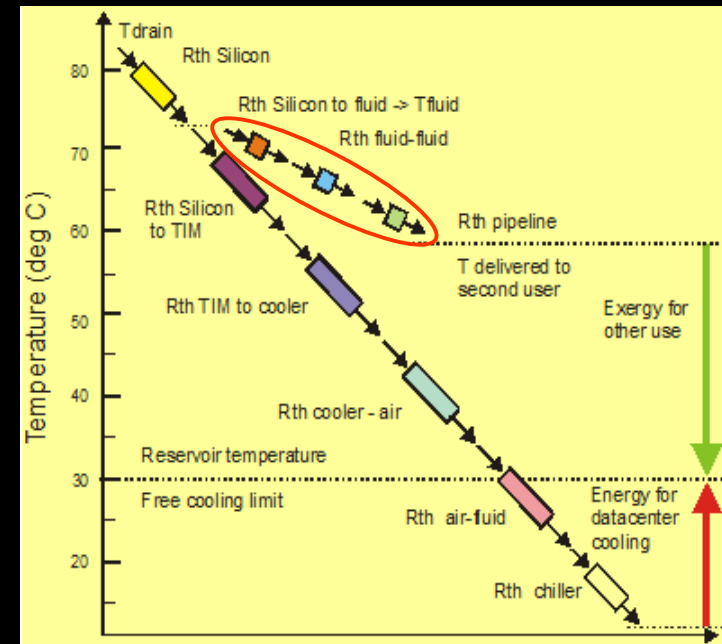
Innovation Focus: Services
Emerging Technologies: None chosen

Eddie Aronovich
The School of Computer Science - Tel Aviv University, IL
[@cs.tau.ac.il](mailto:cs.tau.ac.il)
20:28 UTC, Jul 24, 2006

Tel Aviv University participant responds to the idea

Concept for Zero-Emission Datacenter

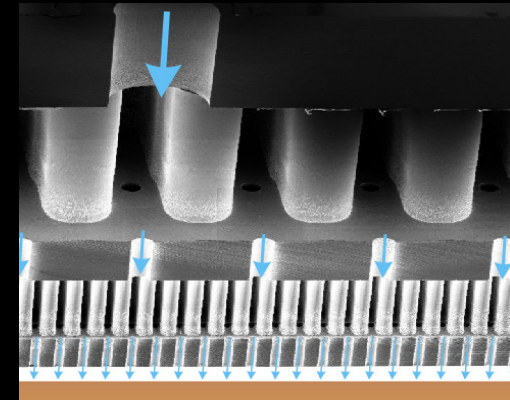
- **Reduce thermal resistances drastically to cool more effectively (with $<10^{\circ}\text{C}$ instead of $>50^{\circ}\text{C}$ gradient)**
 - Bring the cooling directly on the chip, where it is needed
 - Focus liquid cooling on chip hotspots to keep chip temperature constant
- **Increase coolant input temperature to $\sim 45^{\circ}\text{C}$**
 - Use of ambient input temperature or return flow from community heating
 - Keep chip and output temperature constant at $\sim 65^{\circ}\text{C}$ and 55°C , respectively
 - Leakage power is not increased
- **Eliminate thermal cycling with all its reliability problems**
 - Keep chip temperature constant to $< \pm 2^{\circ}\text{C}$



Transition from Air to Liquid Cooling

- **Packaging density improved 10x over past 10 years**

- Volume and cost of air cooling grew 10x over same period
- Air cooling now claims 90% of system volume and weight
- Heat flux limit of air cooling prevents future density improvements



- **Thermal capacity of liquid coolants is 1000 - 4000x larger than of air**

- Smaller investment in datacenter cooling equipment needed
- Less energy needed
- Allows higher power- and integration-density
- Liquid coolers with <math><10x</math> smaller resistance and 100x smaller volume

